QUALITY SEMICONDUCTOR, INC.

QuickSwitch® Products
High-Speed CMOS QuickSwitch 24:12 Mux/Demux

FEATURES/BENEFITS

- Enhanced N channel FET with no inherent diode to V_{CC}
- Bidirectional signal flow
- 24:12 Mux/Demux switches connect inputs to outputs
- Individual controls for each bank
- Zero propagation delay, zero ground bounce
- Undershoot clamp diodes on all control and switch pins
- TTL-compatible control inputs
- Available in a 48-pin QVSOP (Q1)

APPLICATIONS

- Logic replacement
- Video, audio, graphics switching, muxing
- Hot-swapping, hot-docking (Application Note AN-13)
- Voltage translation (5V to 3.3V; Application Note AN-11)
- Bus funneling

DESCRIPTION

The QS33X257 is a high-speed CMOS TTL-compatible 24:12 multiplexer/demultiplexer. The QS33X257 is functionally compatible to three of the QuickSwitch version of the 74F257, 74FCT257, and the 74ALS/AS/LS257 Quad 2:1 multiplexers. The low ON resistance of the QS33X257 allows inputs to be connected to outputs without adding propagation delay and without generating additional ground bounce noise. This part will be used in wide bus multiplexing where board space is at a premium.

Mux/Demux devices provide an order of magnitude faster speed than equivalent logic devices.

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Figure 1. Functional Block Diagram

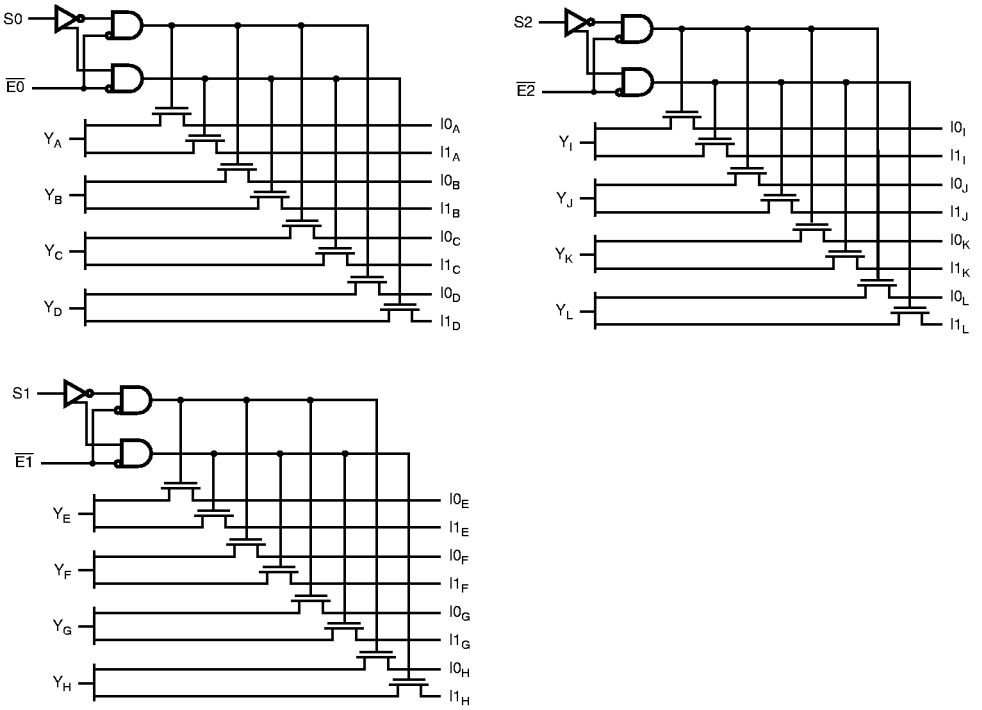

Table 1. Pin Description

Name	I/O	Description
Ixx	I/O	Data Inputs
Sx	I	Select Input
$\overline{Ex}$	I/O	Enable Input
Y_A-Y_L	I/O	Data Outputs

Figure 2. Pin Configuration (All Pins Top View)

QVSOP (Q1)

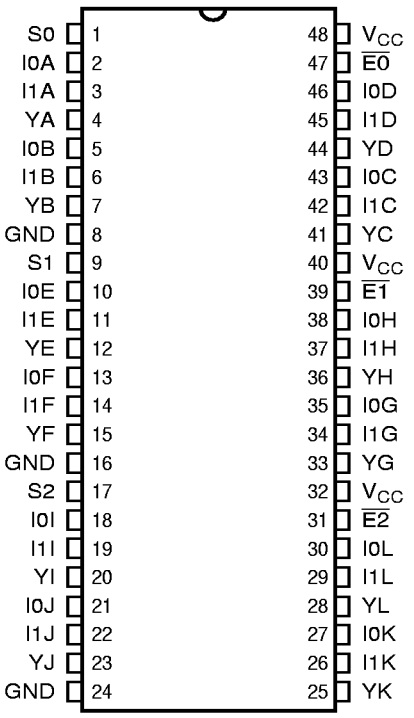

Table 2. Function Table

Inputs		Outputs				
$\overline{Ex}$	Sx	Y_A	Y_B	Y_C	Y_X	Function
H	X	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Disable
L	L	$I0_A$	$I0_B$	$I0_C$	$I0_X$	Select 0
L	H	$I1_A$	$I1_B$	$I1_C$	$I1_X$	Select 1

Table 3. Absolute Maximum Ratings

Supply Voltage to Ground	–0.5V to +7.0V
DC Switch Voltage V_S	–0.5V to +7.0V
DC Input Voltage V_{IN}	–0.5V to +7.0V
AC Input Voltage (for a pulse width ≤ 20ns)	–3.0V
DC Output Current Max. Sink Current/Pin	120mA
Maximum Power Dissipation	0.5 watts
T_{STG} Storage Temperature	–65° to +150°C

Note: ABSOLUTE MAXIMUM CONTINUOUS RATINGS are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute-maximum conditions is not implied.

Table 4. Capacitance

Pins		QVSOP Typ	QVSOP Max	Unit
Control Inputs		4	5	pF
QuickSwitch Channels	Demux	5	7	pF
(Switch OFF)	Mux	9	10	pF

Note: Capacitance is guaranteed, but not tested and are typical values. For total capacitance while the switch is ON, please see Section 1 under "Input and Switch Capacitance."

Table 5. DC Electrical Characteristics Over Operating Range

T_A = –40°C to +85°C, V_{CC} = 5.0V ± 5%

Symbol	Parameter	Test Conditions	Min	Typ(1)	Max	Unit
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH for Control Pins	2.0	—	—	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW for Control Pins	—	—	0.8	V
$\| I_{IN} \|$	Input Leakage Current (Control Inputs)	$0V \le V_{IN} \le V_{CC}$	—	—	1	µA
$\| I_{OZ} \|$	Off-State Current (Hi-Z)	$0V \le V_{OUT} \le V_{CC}$	—	—	1	µA
R_{ON}	Switch On Resistance(2)	V_{CC} = Min., V_{IN} = 0.0V, I_{ON} = 30mA	—	5	7	Ω
		V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15mA	—	10	15	
V_P	Pass Voltage(3)	$V_{IN} = V_{CC}$ = 5V, I_{OUT} = –5µA	3.7	4	4.2	V

Notes:
1. Typical values indicate V_{CC} = 5.0V and T_A = 25°C.
2. For a diagram explaining the procedure for R_{ON} measurement, please see Section 1 under "DC Electrical Characteristics." R_{ON} guaranteed, but not production tested.
3. Pass voltage is guaranteed, but not production tested.

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Figure 3. Typical ON Resistance vs. V_{IN} at V_{CC} = 5.0V

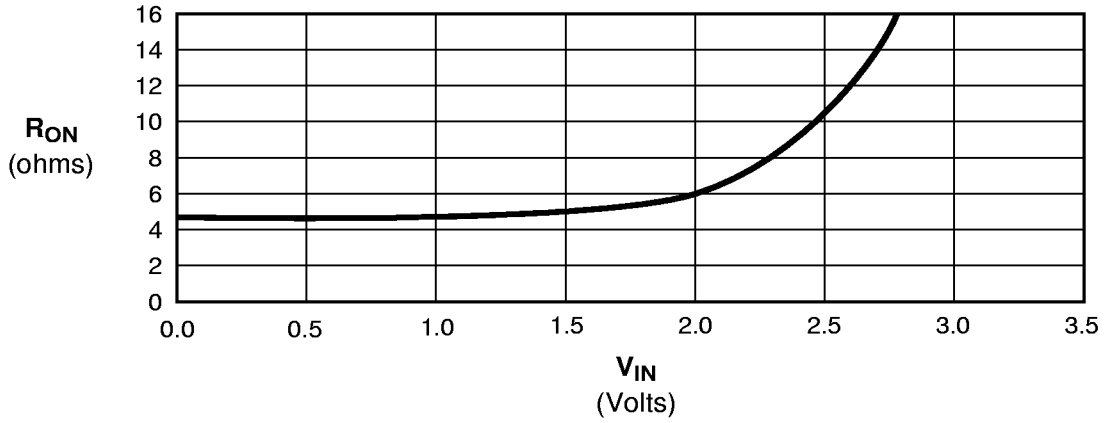


Table 6. Power Supply Characteristics Over Operating Range

T_A = –40°C to +85°C, V_{CC} = 5.0V ± 5%

Symbol	Parameter	Test Conditions[1]	Max	Unit
I_{CCQ}	Quiescent Power Supply Current	V_{CC} = Max., V_{IN} = GND or V_{CC}, f = 0	9	µA
ΔI_{CC}	Power Supply Current[2] per Input HIGH	V_{CC} = Max., V_{IN} = 3.4V, f = 0 per control input	1.5	mA
Q_{CCD}	Dynamic Power Supply Current per MHz[3]	V_{CC} = Max., I and Y Pins Open, Control Inputs Toggling @ 50% Duty Cycle	0.25	mA/ MHz

Notes:
1. For conditions shown as Min. or Max., use the appropriate values specified under DC specifications.
2. Per TTL driven input (V_{IN} = 3.4V, control inputs only). I and Y pins do not contribute to I_{CC}.
3. This current applies to the control inputs only and represents the current required to switch internal capacitance at the specified frequency. The I and Y inputs generate no significant AC or DC currents as they transition. This parameter is guaranteed, but not production tested.

Table 7. Switching Characteristics Over Operating Range

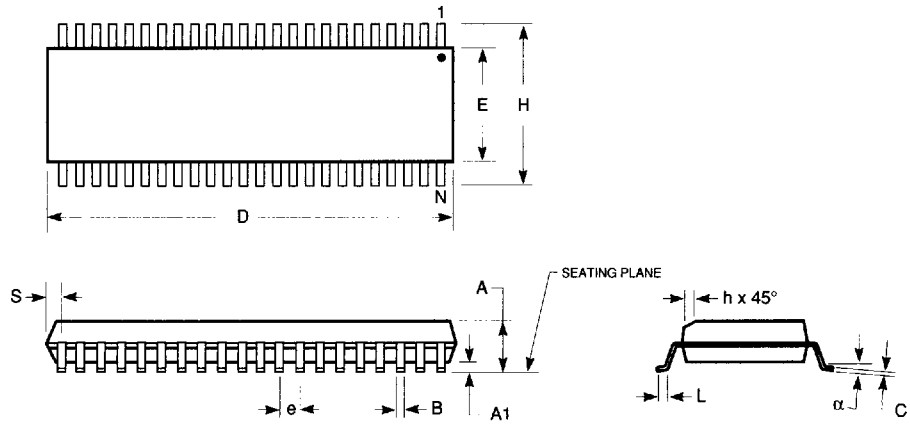
T_A = –40°C to +85°C, V_{CC} = 5.0V ± 5%
C_{LOAD} = 50pF, R_{LOAD} = 500Ω unless otherwise noted.

Symbol	Description[1]	QS33X257 Min	Typ	Max	Unit
t_{PLH} t_{PHL}	Data Propagation Delays[2,3] In to Y	—	0.25[3]	—	ns
t_{PZH} t_{PZL}	Switch Turn-on Delay Sn to Y	0.5	—	5.2	ns
t_{PZH} t_{PZL}	Switch Turn-on Delay $\overline{En}$ to Y	0.5	—	4.8	ns
t_{PHZ} t_{PLZ}	Switch Turn-off Delay[2] $\overline{En}$ to Y, Sn to Y	0.5	—	5.0	ns

Notes:
1. See Test Circuit and Waveforms. Minimums guaranteed, but not production tested.
2. This parameter is guaranteed, but not production tested.
3. The bus switch contributes no propagation delay other than the RC delay of the ON resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25ns C_L = 50pF. Since this time constant is much smaller than the rise/fall times of typical driving signals, it adds very little propagation delay to the system. Propagation delay of the bus switch when used in a system is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.

150-MIL QVSOP™ - Package Code Q1/Q2

150-Mil Wide Plastic Small Outline Gull-Wing



JEDEC#	MO-154BB			MO-154AB		
DWG#	PSS-40A (Q2)			PSS-48A (Q1)		
Symbol	Min	Nom	Max	Min	Nom	Max
A	0.059	0.065	0.069	0.059	0.065	0.069
A1	0.004	0.006	0.008	0.004	0.006	0.008
B	0.0067	0.008	0.009	0.0051	0.0063	0.008
C	0.0075	0.008	0.0098	0.0075	0.008	0.0098
D	0.386	0.390	0.394	0.386	0.390	0.394
E	0.150	0.154	0.157	0.150	0.154	0.157
e	0.0197 BSC, 0.5mm			0.0157 BSC, 0.4mm		
H	0.228	0.236	0.244	0.228	0.236	0.244
h	0.010	0.013	0.016	0.010	0.013	0.016
L	0.020	0.024	0.030	0.020	0.024	0.030
N	40			48		
α	0°	5°	8°	0°	5°	8°
S	0.006	0.008	0.010	0.012	0.014	0.016

Notes:
1. Refer to applicable symbol list.
2. All dimensions are in inches.
3. N is the number of lead positions.
4. Dimensions D and E are to be measured at maximum material condition but do not include mold flash. Allowable mold flash is 0.006in. per side.
5. Lead coplanarity is 0.003in. maximum.